

SCIENCE

And Technology Program



FY 1993 - FY 2002

Typically, 30 to 50 percent of irrigation water is lost through canal seepage, with the most severe (angular) soil conditions accounting for the highest seepage rates and the most design challenges. Canal-lining technologies are needed that can minimize seepage losses at reasonable costs. Low-tech lining systems that can be installed by irrigation district forces offer the most promise. Test sections will be evaluated for effectiveness and long-term durability.

Identify lining options best suited for use on Reclamation facilities. Determine effectiveness, design life, maintenance costs, life-cycle costs, seepage rates, cost of conserved water (\$/acre-foot), and Benefit/Cost (B/C) ratios for each test section.

Twenty-seven test sections have been constructed using combinations of geomembranes, geotextiles, shotcrete, roller compacted concrete, grout mattresses, soil, protective coatings, and sprayed-in-place foam. Test sections are being evaluated for effectiveness and long-term durability. Effectiveness is determined by comparing pre-construction and post-construction seepage rates from full-scale ponding tests. All the test sections are being inspected annually to ascertain condition, collect maintenance data, and predict durability. Life-cycle costs are calculated from initial construction costs, maintenance costs, and life expectancies. Finally, the cost of conserved water is calculated (\$/acre-foot) for use in Cost/Benefit Analysis. Results through 7 years are summarized in the table below.

Each of the lining alternatives offers advantages and disadvantages. The geomembrane with concrete cover seems to offer long-term performance because the geomembrane provides the water barrier, while the concrete cover provides mechanical protection.

Pacific Northwest Region, Bureau of Reclamation

Geosynthetic Manufacturers

Seven irrigation districts (North Unit, Arnold, Tumalo, Lugert Altus, Juniper Flat, Ochoco, and Frenchtown)

December 1998 - 6-Year Ponding Report - North Unit Canal

May 1999 - Paper for Geosynthetics 99 Conference, Boston

Swihart, Jay and Jack Haynes. September 1999. Canal-Lining Demonstration Project Year 7 Durability Report. Bureau of Reclamation, R-99-06.